



IN THE  
UNITED STATES  
PATENT AND TRADEMARK OFFICE

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TECHNOLOGY CENTER 2800

IN RE APPLICATION OF: Hummel, et al.

CASE: OST-001407

SERIAL NO.: 09/755,401

FILED ON: January 5, 2001

FOR: OPTICAL SYSTEM

AFFIDAVIT OF DR.  
ARTHUR HOEGELE  
UNDER 37 C.F.R.  
SECTION 1.132

ASSISTANT COMMISSIONER  
FOR PATENTS  
Washington DC 20231

ATTENTION OF: 2851

EXAMINER: Khaled Brown

Dear Sir:

If any charges or fees must be paid in connection with the following communication, they may be paid out of our Deposit Account No. 50-0545.

1. I am currently employed as a team manager for system integration at Carl Zeiss SMT AG. in the Federal Republic of Germany.
2. As a team manager for System integration, my responsibilities include, among other things, integration and adjustment of projection lenses, aberration corrections in projection lenses.

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3. Prior to my employment with Carl Zeiss SMT AG., and, more specifically, since 1995, I have been employed in various educational and/or commercial positions wherein my responsibilities primarily included Research and Development in Laser Technology.

4. The positions I have held and organization I have worked for include:

Date: 1995-1997 Organization: Laser Zentrum Hannover, Research

Date: 1997 - 1998 Organization: Wavelight Laser GmbH Erlangen, Germany,

Development

4. My educational background includes the following:

Diploma in Physik; University Bonn, 1994  
Dr. rer.nat; University Hannover, 1997

5. I am active or have been active in the following professional associations:

Deutsche Physikalische Gesellschaft eV.

6. Over my 4 years career, I have achieved a level of expertise in the integration and adjustment of projection lenses, including in the correction of aberrations in projection lenses.

7. I have reviewed the entire pending patent application for U.S. Serial No. 09/755,401 invented by Hummel, et al., including a review of the claims as presently pending in the application.

8. I have reviewed the Office Action mailed June 20, 2002 as well as the prior art cited by the Examiner, and, in particular, Nishi, et al., U.S. Pat. No. 5,883,704. Additionally, I have been informed of the issues discussed during the August 28, 2002 in-person interview between the Examining Attorney and Jody L. Factor, Esq.

9. After reviewing the Examiner's basis for rejection of the Hummel application, it is my opinion, as one intimately familiar with the integration and adjustment of projection lenses and aberration corrections in projection lenses, that the Examiner's rejection of claims 1-24 as being anticipated by Nishi '704 is incorrect.
10. Nishi '704 covers a projection optical system disclosing means/methods for controlling/correcting rotationally symmetrical image aberrations. Specifically, Nishi '704 discloses a device that is able to correct/control aberrations caused by the partial absorption of exposure light by lens elements of a rotationally symmetric projection optical system.
11. The Examiner has asserted that the invention disclosed by Nishi '704 covers both a rotationally symmetrical and rotationally non-symmetrical means for correcting imaging aberrations. This is incorrect. From the manifold descriptions and figures it is clear that all imaging characteristics described in Nishi '704 are solely directed to rotationally symmetric systems and, as such, any teachings within Nishi '704 relative to means/methods for correcting/controlling image aberrations are only disclosed relative to rotationally symmetric systems.
12. My opinion relative to the rotationally-symmetric nature of the disclosure in Nishi '704 is based on the language used in the specification, as well as the depiction of the device in the drawings of that patent. Even from a merely cursory review of the specification and claims, one of ordinary skill in the art would only be led to apply the teachings of Nishi '704 to a rotationally-symmetric system.
13. The rotationally symmetric characteristic's of Nishi '704 can be deduced by the common use of the term "image height," or "H" in figures 7(a), 7(b), 7(c), 8, 15(a), and 15(b). "Image height," as used in lens design literature (see, e.g., Lens Design Fundamentals by R. Kingslake),

is defined as the radial distance of the image object point from the optical axis of the lens. The figures in Nishi '704 illustrate a YZ-cut of the device in Figures 1-5A, 33-36, and 42-45, and an XZ-cut in Figures 46-47, within which the "image height," by the above definition, would remain optically identical. Thus, the "image height" characteristic applies equally to the device in Nishi '704, regardless of the particular axis that is investigated. Accordingly, the image characteristics of the system described by Nishi '704 are rotationally symmetric, and not rotationally non-symmetric.

14. Additionally, Nishi '704 describes itself as attempting to overcome distortion phenomena, including linear errors, also known as "linear magnification errors" (LME), and non-linear errors. A LME is defined as a function of the image height (Col. 1, lines 54-56), and as such comprises a rotationally-symmetric aberration. Furthermore, in lens design literature magnification is always defined as a rotationally symmetric aberration.

15. The rotationally symmetric design can also be inferred when looking at the imaging characteristic of "curvature of field" (CF) or "non-linear defocus" (Col. 2, lines 8-33), as illustrated in figures 22(a) and 22(b). Figure 30(a) displays the CF as a symmetrical function in the X and Y coordinates, which implies that the CF is a rotationally symmetric aberration. Furthermore, in the lens design literature, "field curvature" is used for rotationally symmetric aberrations of the image plane.

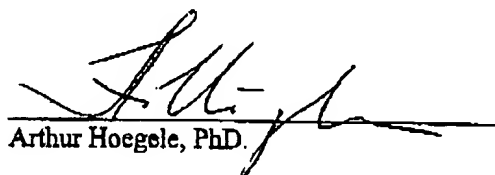
16. Based at least in part on the above disclosures taken directly from Nishi '704, it is my opinion that Nishi '704 is solely directed to a system that is rotationally symmetric in nature. The rotationally symmetric nature of Nishi '704 is clear, and would be clear to one of ordinary skill in the art, from the use of exclusively rotationally symmetric language to describe the image

aberrations and the image characteristics of both the prior art discussed in Nishi '704, and the Nishi '704 device itself.

17. It is also my opinion that it would not be obvious to one of ordinary skill in the art to apply the teachings of Nishi '704, directed to a rotationally symmetric system, to a non-rotationally symmetric system such as is claimed in the Hummel application. The imaging characteristics of a rotationally symmetric system differ greatly from the imaging characteristics of a rotationally non-symmetric one, and thus one of ordinary skill of the art would not look to the teachings of Nishi '704, clearly directed only to a rotationally symmetric system, to solve the imaging aberration problems of a rotationally non-symmetric system.

18. I hereby state that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true: and further that these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. Section 1001, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

This 18<sup>th</sup> <sup>December</sup> day of ~~November~~, 2002.

  
Arthur Hoegsele, PhD.